

## A NEW SCALE WORM (POLYCHAETA: POLYNOIDAE) FROM THE HYDROTHERMAL RIFT-AREA OFF WESTERN MEXICO AT 21°N

Marian H. Pettibone

*Abstract.*—A unique polynoid polychaete, *Lepidonotopodium fimbriatum* n. gen., n. sp., is described from the hydrothermal vent area at 21°N off western Mexico and referred to a new subfamily of Polynoidae, the Lepidonotopodinae.

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During *Alvin* dives 1213 and 1223 in 1982 to the East Pacific Rise hydrothermal vent area at 21°N in the Pacific Ocean off western Mexico, three adults and one young specimen of a unique polynoid polychaete were collected at 2600 meters depth in the Clam Acres area. They were made available to me by Dr. Kenneth Smith of Scripps Institution of Oceanography, University of California, San Diego. This is OASIS Expedition Contribution number 10.

The types are deposited in the National Museum of Natural History, Smithsonian Institution (USNM).

### Family Polynoidae

#### Lepidonotopodinae, new subfamily

#### *Lepidonotopodium*, new genus

*Type-species.*—*Lepidonotopodium fimbriatum*, new species.

*Diagnosis.*—Body short, flattened, subrectangular; 28 segments (first achaetous). Elytra and prominent elytraphores 11 pairs, on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, with dorsal cirri on posterior 7 segments. Prostomium deeply bilobed; median antenna with ceratophore inserted in anterior notch, with short style; without lateral antenna but with small frontal filaments on subtriangular lobes of prostomium; paired palps cylindrical, smooth, with filamentous tips; without eyes. First or tentacular segment fused to prostomium, not visible dorsally; tentaculophores lateral to prostomium, each with pair of tentacular cirri, single aciculum, without setae; without facial tubercle. Second segment with first pair of elytra, biramous parapodia, and ventral or buccal cirri attached to basal parts of parapodia lateral to mouth; styles longer than following ventral cirri. Parapodia biramous, with notopodia shorter than neuropodia. Notopodia subconical, with projecting acicular processes and well-developed bracts encircling notopodia anteriorly and dorsally. Neuropodia diagonally truncate, deeply notched dorsally, without projecting acicular processes. Distal tips of notopodia, notopodial bracts, and neuropodia fimbriated with slender papillae. Notoetae numerous, subequal in width to neuroetae, with single rows of widely spaced spines and blunt tips. Neuroetae numerous, with 2 rows of numerous spines along one side and slightly hooked blunt tips. Dorsal cirri on segments lacking elytra, with cylindrical cirrophores attached on posterodorsal sides of notopodia, with tapered styles; ventral cirri short, tapered, attached near middle of neuropodia. Dorsal tubercles on cirriferous segments large, inflated. Elytraphores, dorsal tubercles

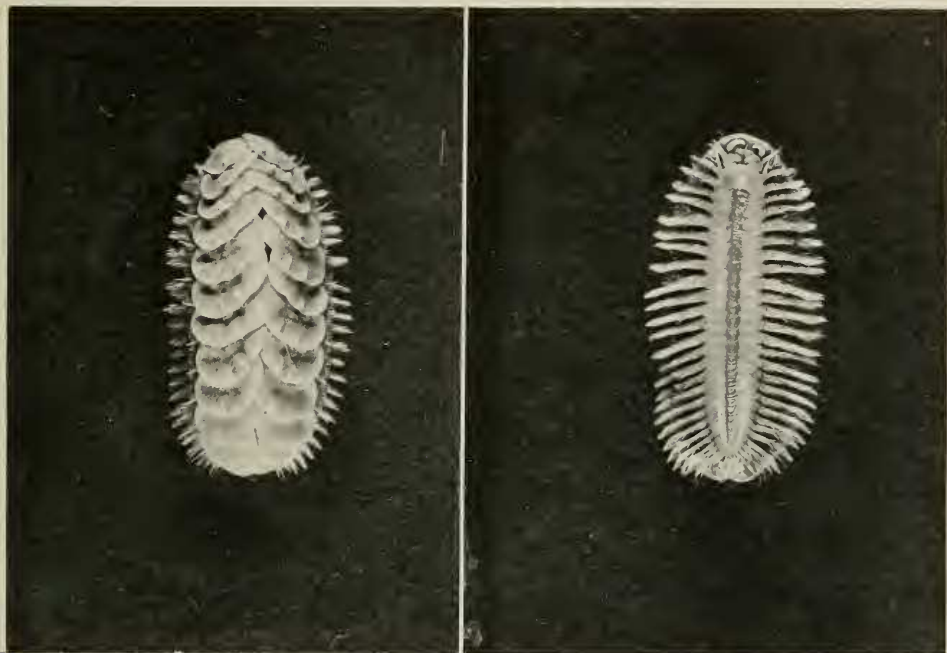


Fig. 1. *Lepidonotopodium fimbriatum*, holotype, USNM 80113: Dorsal view, left; ventral view, right. 2 $\times$ .

and their bases with numerous ciliated ridges separated by thin-walled integument. Ventral segmental papillae lacking or with 2 pairs of large papillae on segments 11 and 12, extending dorsally between neuropodia. Pygidium dorsal, large, bulbous, wedged between parapodia of posterior 3 segments, with pair of ventral anal cirri. Pharynx with 7 pairs of papillae—7 dorsal with median one larger and 7 ventral with median one short; 2 pairs of jaws with few (5–7) basal teeth.

*Etymology*.—The generic name is derived from Greek, *lepidos*, scale or bract; *notos*, back; *podos*, foot, referring to the bracts on the notopodia. Gender: masculine. The specific name is derived from Latin, *fimbria*, fringe, referring to the fimbriated parapodia.

*Lepidonotopodium fimbriatum*, new species

Figs. 1–5

*Material examined*.—Pacific Ocean off western Mexico, 20°50'N, 109°06'W, 2600 m, *Alvin* dive 1213, sample B21, 19 April 1982, Clam Acres—holotype, USNM 80113, and 2 paratypes, USNM 80114, 80115. Same area, *Alvin* dive 1223, sample 10A, 7 May 1982—paratype, young, USNM 80116.

*Description*.—The 3 adult types are similar in size: 23–24 mm in length, 12–13 mm in width, including setae, with 28 segments, the last segment very small. All specimens are uniformly dark greyish in color, stout, short-bodied, rectangular in outline, flattened ventrally, strongly arched dorsally, and slightly tapered and rounded anteriorly and posteriorly (Fig. 1). The elytra are thick, leathery, imbricated.

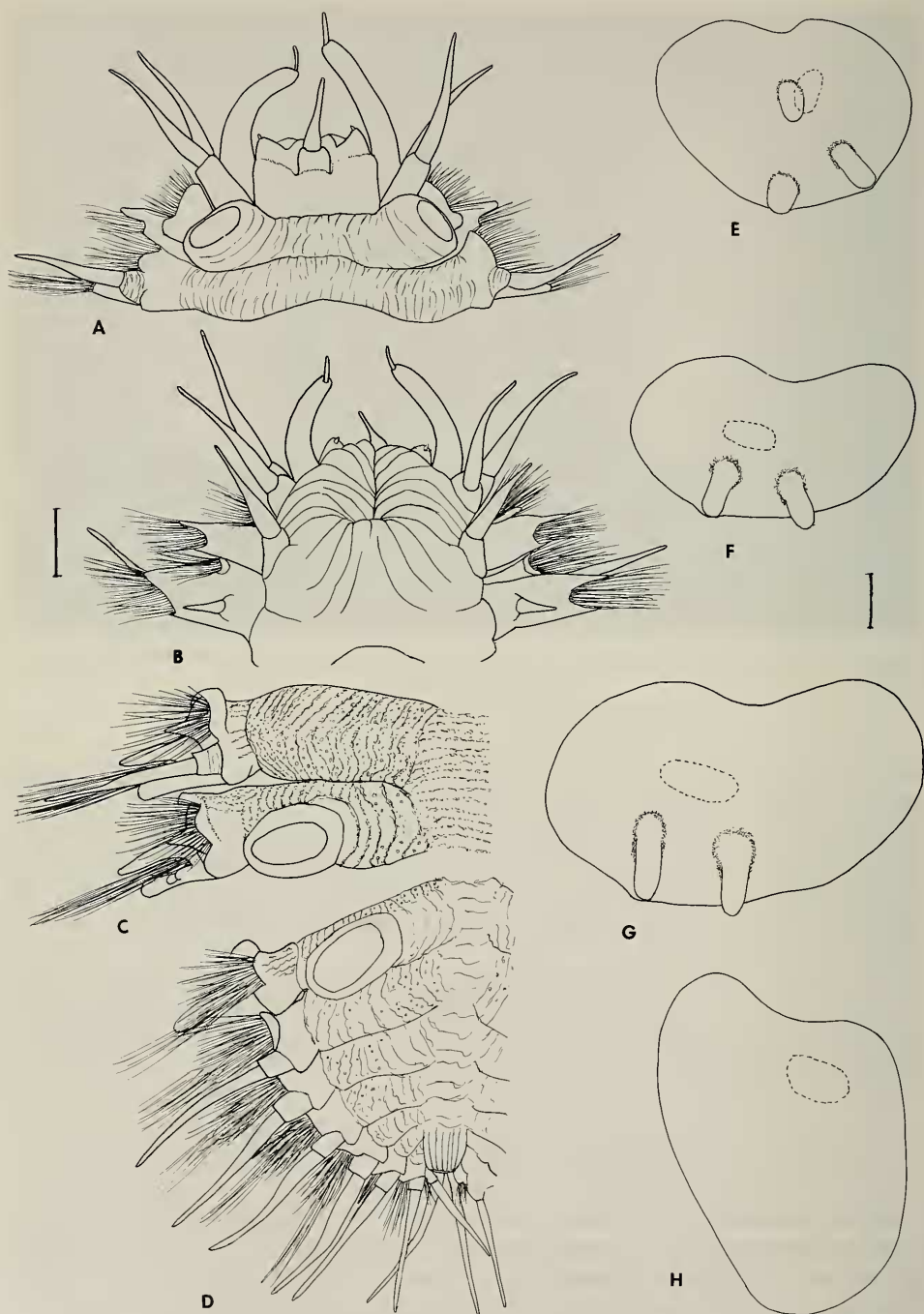


Fig. 2. *Lepidonotopodium fimbriatum*, paratype, USNM 80115: A, Anterior end, dorsal view; B, Anterior end, ventral view; C, Left side of segments 12 (cirriferous) and 13 (elytriferous), dorsal view; D, left side of posterior end (segments 21-27 and pygidium), dorsal view; E, Left first elytron, place of attachment dotted; F, Left second elytron; G, Left middle elytron; H, Right eleventh elytron. Scales = 1.0 mm for A-D; 1.0 mm for E-H.

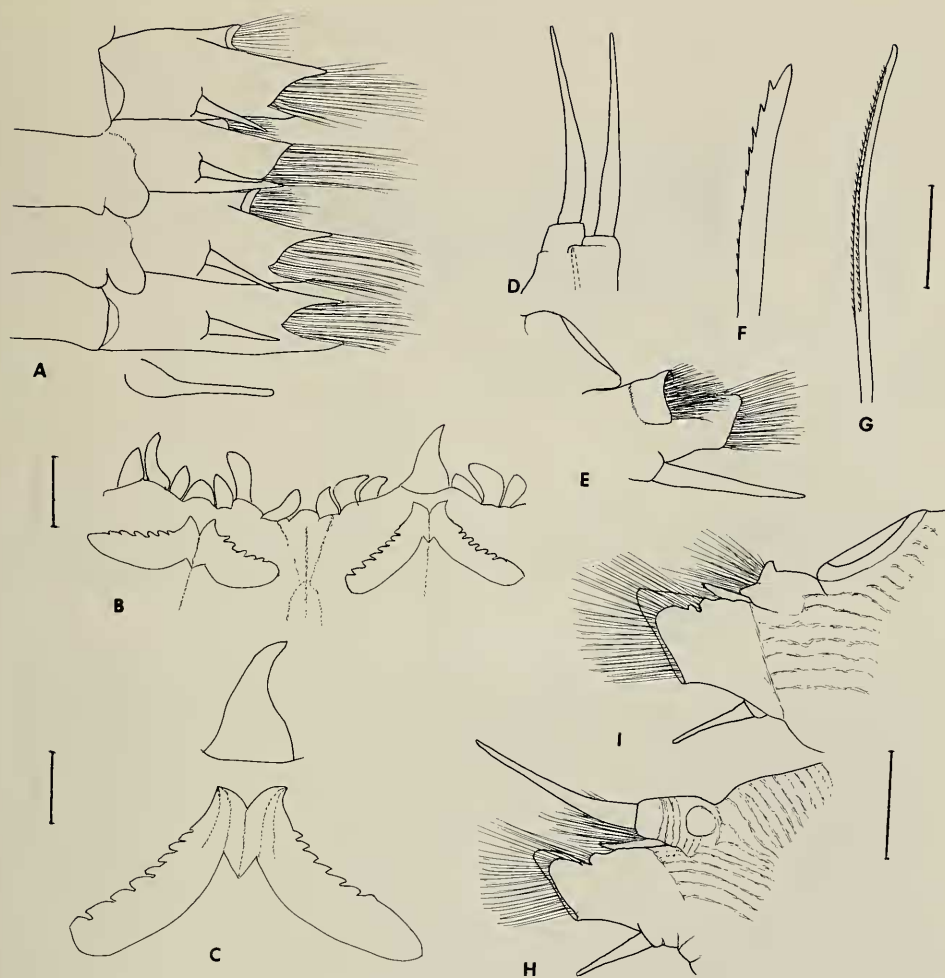


Fig. 3. *Lepidonotopodium fimbriatum*, paratypes, A, USNM 80114; B-I, USNM 80115: A, Left side of segments 10-13, ventral view; distal tip of segmental papilla extending dorsally between parapodia shown separately; B, Distal part of pharynx cut open and spread apart, ventral half on left, dorsal half on right; C, Dorsal jaws and median dorsal papilla; D, Tentacular parapodium, inner view, aciculum dotted; E, Elytrigerous parapodium from segment 2, anterior view; F, Notoseta from same; G, Neuroseta from same; H, Cirriferous parapodium from segment 3, posterior view; I, Elytrigerous parapodium from segment 4, posterior view. Scales = 1.0 mm for A, B; 0.5 mm for C; 1.0 mm for D, E, H, I; 0.1 mm for F, G.

cated, covering the dorsum (Fig. 1). There are 11 pairs of elytra attached on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19 and 21, with dorsal cirri on the posterior 7 segments (Fig. 2D). Except for the first and last pairs, each elytron has 2 raised smooth macrotubercles on the posterior one-third, not sharply set off from the surface (Figs. 1, 2F, G). The first pair of elytra (on segment 2) have an additional tubercle on the medial side of the place of attachment (Fig. 2E). The last pair of elytra (on segment 21) lack macrotubercles; they are more elongated and cover the posterior cirriferous segments and pygidium (Fig. 2H). The elytra are reni-



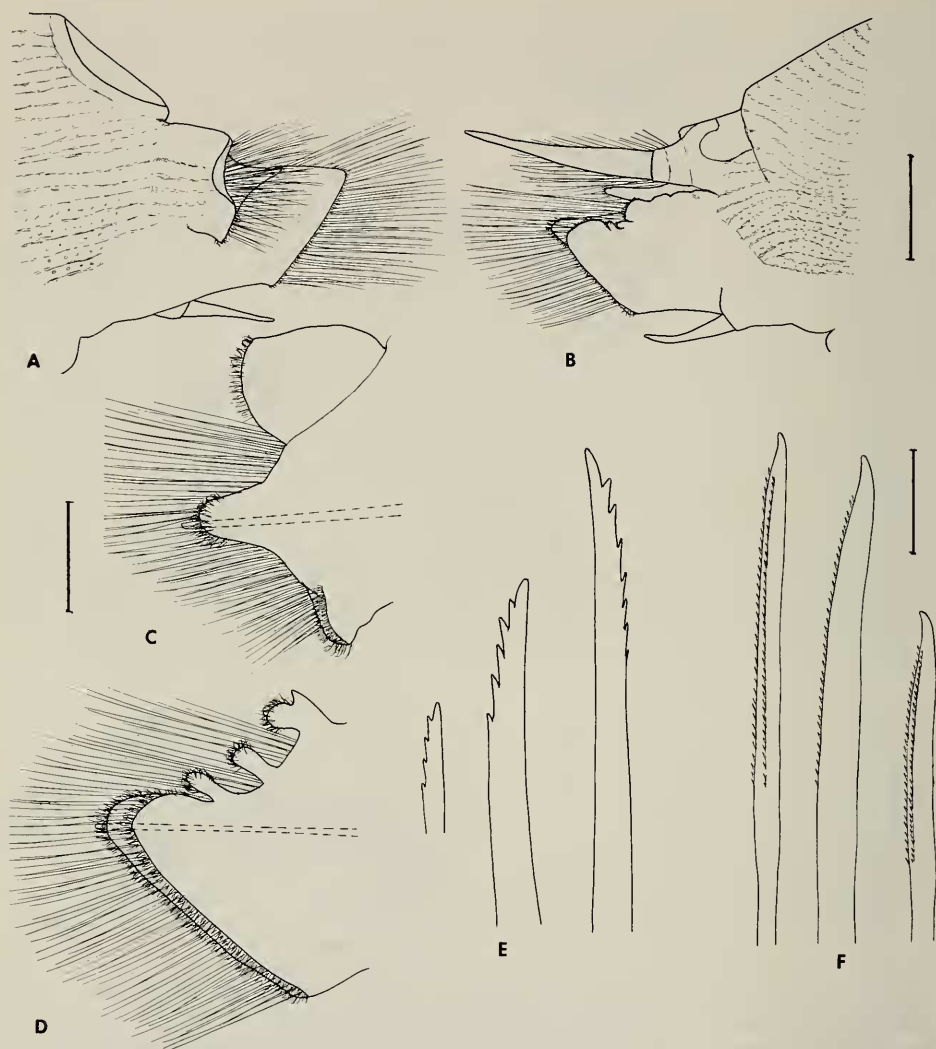


Fig. 4. *Lepidonotopodium fimbriatum*, paratype, USNM 80115: A, Left middle elytrigerous parapodium, anterior view; B, Left middle cirriferous parapodium, posterior view; C, Enlarged notopodium and bract, posterior view, notoaciculum dotted; D, Enlarged distal part of neuropodium, posterior view, neuroaciculum dotted; E, Notosetae from middle parapodium; F, Upper, middle and lower neurosetae from middle parapodium. Scales = 1.0 mm for A, B; 0.5 mm for C, D; 0.1 mm for E, F.

form, attached eccentrically to large prominent elytriphores (Figs. 2A, C, D, 3I, 4A). The elytral surface appears smooth but is covered with numerous round microtubercles giving a dotted appearance, along with some scattered globular micropapillae. The dorsal cirri on the segments lacking elytra have cylindrical cirrophores attached dorsoposteriorly on the notopodia; they are wider basally with a bulbous lobe on the posterior side; the styles are tapering and extend to about the tips of the neurosetae (Figs. 2A, C, 3H, 4B). The dorsal tubercles on

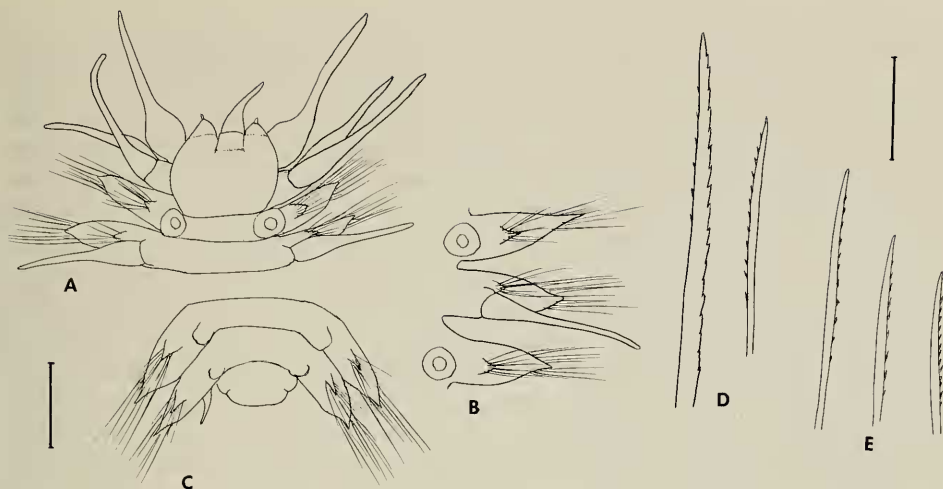


Fig. 5. *Lepidonotopodium fibriatum*, young paratype, USNM 80116: A, Anterior end, dorsal view; B, Right parapodia of segments 5-7, dorsal view; C, Posterior end, dorsal view; D, Notosetae; E, Neurosetae. Scales = 0.2 mm for A-C; 0.1 mm for D, E.

the cirriferous segments, corresponding in position to the elyptrophores, are large and inflated. The surfaces of both the elyptrophores and dorsal tubercles, including their bases, have numerous ciliated ridges interspersed with thin integument, sometimes appearing as pits (Figs. 2C, D, 3H, I, 4A, B). The ridges continue on the upper halves of the anterior and posterior sides of the parapodia altogether forming well-developed ciliated lacunar areas. The surface of the middorsum is wrinkled, that of the ventral surface essentially smooth.

The prostomium is bilobed, the anterior lobes subtriangular, each with a small frontal filament; lateral antennae are absent (Fig. 2A, B). The median antenna is inserted in the anterior notch, having a short cylindrical ceratophore and short subulate style. The palps are cylindrical, smooth, with filamentous tips, about twice the length of the prostomium. Eyes are lacking. The first or tentacular segment is not visible dorsally; the tentaculophores are lateral to the prostomium, each with a single aciculum but without a distinct acicular lobe and without setae (Figs. 2A, B, 3D). The styles of the 2 pairs of dorsal and ventral tentacular cirri are similar in length, smooth, tapered, slightly shorter than the palps. A facial tubercle is lacking.

The second or buccal segment bears the first pair of large elyptrophores, biramous parapodia and ventral or buccal cirri attached basally on prominent cirrophores lateral to the mouth; their styles are similar to the tentacular cirri and longer than the following ventral cirri (Figs. 2A, B, 3E). The ventral mouth is enclosed in upper, lateral, and posterior lips between segments 1 to 3 (Fig. 2B). The pharynx was not extended but was dissected out and slit open (Fig. 3B, C). The opening of the large muscular pharynx is encircled by 7 pairs of large bulbous papillae: 7 dorsal with the median one larger and 7 ventral with the median one smaller. The 2 pairs of dorsal and ventral jaws are fused medially and the basal parts are serrated with 5-7 teeth.

The biramous parapodia have shorter notopodia located on the anterodorsal sides of the longer neuropodia (Figs. 3H, I, 4A, B). The notopodia are conical, with projecting acicular lobes and enclosed anterodorsally by well-developed large flaring bracts (Figs. 2C, D, 4A–C). The neuropodia are diagonally truncated and deeply cleft on the upper part. The presetal acicular lobe projects dorsally beyond the rounded postsetal lobe; the upper margin of the latter has 3 rounded papillated extensions (Fig. 4B, D). The distal margins of the notopodial acicular lobes, notopodial bracts, and neuropodial lobes are fimbriated with slender papillae. The notosetae are numerous, forming radiating bundles; they vary in length, are similar in width to the neurosetae and have relatively few (4–7; 7–11 on segment 2) widely-spaced spines along one side and blunt rounded tips (Figs. 3F, 4E). The neurosetae are numerous, forming fan-shaped bundles. They are all similar, the upper ones being slightly more slender and the lower ones shorter (more slender on segment 2); they have 2 rows of numerous spines along one side, with slightly hooked bare tips (Figs. 3G, 4F). The ventral cirri are short, tapered, smooth and attached on the middle of the neuropodia (Fig. 3A).

Segmental or nephridial papillae are not obvious. On one of the 3 adult types (USNM 80114), there are 2 pairs of large bulbous papillae on the ventral side of segments 11 and 12, narrowing and projecting dorsally between the parapodia (Fig. 3A). The pygidium is visible dorsally as a bulbous lobe wedged between the parapodia of the 3 posterior smaller segments (26–29), the last one being quite small; there is a pair of long ventral anal cirri, similar to the posterior dorsal cirri (Fig. 2D).

The small paratype (USNM 80116), collected from the same site but on a later dive, is 1 mm long, 1 mm wide including setae, with 11 segments plus a growing zone and pygidium (Fig. 5C). No elytra remain. The prostomium resembles that found in the adults except that the palps are bulbous basally and slender more distally (Fig. 5A). The tentacular and dorsal cirri are also wider basally (Fig. 5A, B). The notosetae have more numerous spines (Fig. 5D); the neurosetae are more slender and have fewer and larger spines (Fig. 5E).

*Remarks.*—Based on the structure of the prostomium and tentacular segment, *Lepidonotopodium* could be placed in the subfamily Macellicephalinae, as revised by Pettibone (1976), in having the prostomium bilobed with short frontal filaments on the anterior lobes, a median antenna with a distinct ceratophore in the anterior notch, without lateral antennae, with paired palps and two pairs of tentacular cirri lateral to the prostomium. Of the genera in the Macellicephalinae, *Lepidonotopodium* is closest to *Bathykurila* Pettibone, based on the type of notosetae and neurosetae. The shapes of the parapodia differ, however.

Jaws with serrated basal plates, characteristic of the aphroditacean family Acoetidae (=Polyodontidae), are not the usual type in the Polynoidae but they are known for some bathyal species, such as *Bathyvittazia pallida* (Levenstein) and *Bruunilla natalensis* Hartman in the Macellicephalinae and for *Bathyedithia berkeleyi* (Levenstein) and *B. tuberculata* Levenstein in the Bathyedithinae (Pettibone 1976, 1979; Levenstein 1981).

*Lepidonotopodium* is unique in the Polynoidae in having well-developed bracts encircling the notopodia. This is known in some other families of the scaled polychaetes or Aphroditacea, such as the Sigalionidae, but not in the Polynoidae.

The numerous ciliated ridges separated by thin integument on the elytophores, dorsal tubercles and anterior and posterior sides of the parapodia appear to be

unique in the Polynoidae. Beneath the surface there appear to be sponge-like areas with ciliated lacunar passages, perhaps serving for respiratory exchange, a feature worthy of future investigation.

The presence of fimbriated parapodia, formed of filiform papillae on the distal margins of the notopodia, notopodial bracts, and neuropodia, are also at least unusual in the Polynoidae. Filiform papillae are found on the distal margins of the neuropodia in some members of the Lepidonotinae, such as *Hermenia* Grube, *Halosydropsis* Uschakov and Wu, *Parahalosydropsis* Pettibone, and *Lepidodropsis* Pettibone, as indicated by Pettibone (1975, 1977).

The type of elytra with nodular macrotubercles not sharply set off from the surface, as found in *Lepidonotopodium fimbriatum*, is also unusual in the Polynoidae. Similar structures are found on the elytra of *Bathynoe nodulosa* Ditlevsen (1917:42, pl. 3: fig. 12), collected in the North Atlantic south of Iceland in a depth of 1992 meters, and in *Bathynoe nodulosa pacifica* Uschakov, 1950, from the Okhotsk Sea in a depth of 1366 meters (see Uschakov 1955:134, fig. 24C; 1965: 115, fig. 24C, as *Weberia*). *Lepidonotopodium* and *Bathynoe* (= *Weberia*, preoccupied) differ in a number of other features.

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